

the citizens of Norwich, dated June 29, 1286. That the culture and preparation of woad was practically the same in the time of Ruellius (1536), Crolachius (1575), Wedelius (1675), and Ray (1686) as it is now their writings show. It is probable some very simple process was used by the dyers in these olden times, as simple as that by which the blue colour can be obtained from the fresh plant—at any rate, less complicated than the woad-vat Helliot describes in 1750 for dyeing with woad and indigo, and which is given, with variations, in encyclopædias down to the present time.

CHARLES B. PLOWRIGHT.

CONTACT ELECTRICITY.

AT the meeting of the Physical Society, a few weeks ago, when the subject of Contact Electricity was under discussion, the President was asked by his friendly opponents to commit himself to a definite interpretation of the fundamental equation, and to a precise statement as to what quantity he recognised as "contact potential difference." Prof Lodge did not then comply with the request, but he promised to address the Society upon "Contact Electricity" at their annual general meeting on February 9. It is rather a matter for regret that this ancient feud is so near to amicable settlement. The controversy has held its own for a little more than a century, and throughout that time it has acted as a never-failing stimulus to research in the laboratory. Physicists are now retracing the steps of their arguments, revising their definitions, amending their phrases, and trying hard to understand one another's parlance. No scientific dispute can outlive such precautions.

The case for both sides has frequently been stated. Perhaps the best account consistent with brevity is that given in Prof. A. Gray's "Magnetism and Electricity," Chap. xii. This, in common with all modern summaries of the subject, is admittedly derived from Prof. Lodge's British Association Report of 1884. Those who desire to bring themselves into closer acquaintance with the latest developments of the argument should read the article on "Contact Electricity," by Mr. W. A. Price, in the *Electrical Review* of December 29, 1899. Mr. Price seeks to locate the dispute to the meaning of words, and chiefly to the word "potential." He explains that "potential" is essentially a property of a position in space, and that it implies neither the existence nor the absence of matter near or at a point of which potential is predicated. The expression "potential at a point" has *per se* no ambiguity. But when measurements of the potential at a point are required, the methods employed, from their indirect character, necessitate certain assumptions; and the quantity is no longer free from ambiguity. Potential is generally measured indirectly, as the result of an investigation of the electrical force in the neighbourhood of the given point. The value, so obtained, involves therefore the physical qualities of the fluid medium or media associated with the point, and these have no place in the primary definition of potential. There is, in fact, no experimental foundation for the statement that within a conducting body, not conveying electricity, potential has the same value at all points. Hence no conclusions can properly be drawn until physicists agree amongst themselves as to their cardinal definitions; and when this is accomplished, the controversy will have ceased.

AGRICULTURAL EDUCATION.

WE are slowly realising that success in farming depends quite as much upon scientific knowledge as upon practical training. In other countries this fact has been fully appreciated for many years, and elaborate provision for the interests of agriculture forms a prominent feature of their educational systems. Similar provision has become a necessity for England, if we are to compete with them upon anything like equal terms. In furtherance of this object the Agricultural Education Committee, of which some of the most eminent men of science and agriculturists of the day are members, has recently issued certain definite proposals. Foremost amongst these is a recommendation that all the educational work of the Board of Agriculture should, like that of the Science and Art Department, be transferred to the new Board of Education. If the confusion, overlapping and wasteful expenditure of public money, which have resulted from the multiplication of central authorities, are to be avoided, it is essential that one authority alone should be responsible for the

agricultural education of the country. It would be the function of this authority, aided by inspectors thoroughly familiar with the needs of the agricultural classes, and with the conditions of rural life, to secure an adequate provision of the various forms and degrees of instruction required by all those who are in any way concerned with the cultivation of the soil.

Such instruction must commence with the elementary school, for that is the foundation upon which the whole superstructure has to be built, and the Committee emphasises the importance of differentiating the curriculum of the rural from that of the urban school. This change is not advocated under the impression that it will stem the tide of migration from the country districts. A variety of social and economic causes combine to drive men from the villages into the towns. At the same time, on the principle that "as a twig is bent, so will the tree incline," it is hoped that if children were familiarised from their earliest years with the simple facts of nature, and encouraged to take an intelligent interest in them, a love of the country might be awakened, and the desire to remain in it certainly be strengthened. No suggestion of teaching agriculture or science as such is put forward: years ago, Prof. Huxley pointed out the futility of attempting to teach either one or the other in an elementary school. A rural curriculum should include elementary science lessons upon the life, growth and structure of plants, the habits of birds, animals and insects, the nature of the soil, and air and water, and the utility of the simpler methods of cultivation. These lessons should be illustrated by experiments, and be accompanied by practical work, appropriate to the agricultural character of the locality, done by the pupils themselves in gardens or on plots of ground attached to the school. They should be supplemented further by occasional visits to well-managed farms, and valuable assistance might be given by circulating amongst the teachers and pupils leaflets, similar to the admirable "Nature-Study Leaflets" issued by the agricultural college in Cornell University. In like manner girls should receive elementary instruction in cooking, domestic economy and hygiene. In either case the child will be developing those faculties, and forming those habits, which enable a boy to become a skilled labourer or a successful farmer, and a girl to become a competent servant or a capable housewife. To meet the difficulties of small schools, several parishes must combine to engage the services of a peripatetic teacher. There can be no doubt that in the grouping of villages and schools for educational purposes the solution of many of the problems of rural education will ultimately be found to lie.

As yet it is not easy to find properly qualified teachers, but the Committee suggests various ways in which they may be trained. At the normal colleges in France theoretical and practical instruction in agriculture is provided for the students by the departmental professors, and there does not appear to be any reason why students at some of the training colleges in England should not be similarly taught by the lecturers of the County Councils. It should be remembered that the rural school does not require an agricultural expert; such a teacher would inevitably give undue prominence to one aspect of elementary education, and it might reasonably be objected that an attempt was being made to capture the schools in the interest of one section of the community only. The rural teacher should have a general knowledge of the principles underlying the science of agriculture, and some practical knowledge of agricultural operations. Men so qualified will be rapidly forthcoming as the demand for them becomes more general. In the meantime existing teachers should be assisted to acquire the necessary experience by County Council lectures, practical demonstrations on farms and in gardens, and courses of instruction at agricultural colleges; special facilities by means of scholarships or bursaries should be offered to rural pupil teachers for a course of some duration at any institution where theoretical and practical instruction might be had.

It is necessary to insist upon the importance of the lower branches of agricultural education in view of the small attention which has hitherto been paid to them. The hope of the future lies in our having a constant relay of pupils from the elementary schools fitted to attend and profit by the more advanced classes and colleges. For the majority of rural children evening continuation schools afford the only opportunity for further instruction, and the Committee recommends that it should be made part of the duty of every county organisation (outside London and the county boroughs) recognised under Clause VII.

of the Directory to organise such schools throughout their county, to receive and supplement the grants made by the Board of Education, and to supply and pay qualified teachers. The instruction should be in such subjects as natural history, botany, and other sciences bearing upon agriculture and horticulture, bee and poultry keeping, land measuring, farm accounts, &c., rather than in such subjects as typewriting, commercial arithmetic and shorthand. Between these classes and the highest agricultural colleges, schools should be established in every county, where lads from the age of thirteen to eighteen might obtain two years' thorough theoretical and practical training. Each of these schools should be developed by its managers upon the lines most suitable to the agriculture of the district. Thus it may be possible to organise a satisfactory system of agricultural education, but, as was well observed by M. Tisserand, Director of Agriculture in France in 1896, in his memorandum for the Recess Committee: "the agriculturists must be made to understand that the improvement they desire depends as much upon themselves as upon the Ministry, if not more so; that the latter must be powerless without their help; that they will receive succour from the State in proportion as they themselves put forth energy and labour; and that it is only by the united effort of all concerned that progress can be brought about."

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The practical teaching of physical chemistry is being introduced this term at the Daubeny (Magdalen College) Laboratory. The course of instruction will be given by Mr. Duncan Wilson, who was recently appointed Lecturer in Chemistry to the College, and has studied with Prof. Ostwald.

CAMBRIDGE.—The Allen Scholarship for research, worth 250*l.* for one year, will this term be given for work in medicine, mathematics, physics and chemistry, biology and geology, or moral science. Candidates are to be graduates of the University of not more than twenty-eight years of age. Applications should be sent to the Vice-Chancellor by February 20.

The Faculty of Medicine of the University College of South Wales and Monmouthshire has been recognised for the purpose of medical study outside the University.

Plans and estimates for the new botanical laboratory have been submitted to the Senate. The cost will be over 22,000*l.*

The Mathematical Board have amended in a few details their previous report on the Mathematical Tripos. They now propose that each class in Part I. shall be arranged in two divisions, the names in each being in alphabetical order. They think it important that these divisions should, so far as may be practicable, indicate a uniform standard from year to year. The voting will take place on February 15, at 2 p.m.

Dr. Jackson was on January 26 unanimously elected a member of the Council in the room of Mr. Dale, now Principal of University College, Liverpool.

The present state of war has affected the University in a remarkable manner. Not only have a considerable number of graduates and undergraduates volunteered for active service, but the Vice-Chancellor has summoned a meeting with a view to applying to the Government for an increase of the establishment of the University Rifle Corps. The present strength is 600; it is proposed to increase this to 800, and the recruits are ready. Moreover, it is proposed to place the Senate House at the disposal of the corps for a drill hall, at times when it is not required for University purposes. Colonel Dyke is giving a course of lectures on tactics thrice weekly.

Lord Lister has been appointed an Elector to the Chair of Pathology in the place of the late Sir James Paget.

The State Medicine Syndicate have made a grant of 50*l.* in aid of a course in bacteriology, provided for candidates desiring to obtain the Diploma in Public Health.

THE London County Council have agreed to retain a site in Clare Market, Strand, valued at 14,770*l.*, for the establishment of a school for higher commercial education in connection with the new University of London.

THE Queen's Speech, read at the new session of Parliament, which opened on Tuesday, announced that a measure would be introduced in regard to education in Scotland, and that pro-

posals would be made for better enabling local authorities to aid secondary and technical education in England and Wales.

THE following officers were elected at the annual meeting of the Association of Technical Institutions, held in the Mercers' Hall, London, on Wednesday, January 24:—President, Sir Swire Smith; vice-presidents, Lord Spencer, Sir Bernard Samuelson, Bart., Mr. H. Hobhouse, M.P., Mr. W. Mather; treasurer, Mr. R. F. Martineau (Birmingham); honorary secretary, Prof. J. Wertheimer (Bristol).

IN order to meet increasing demands for space, and to keep pace with modern requirements, the Council of King's College have been obliged to undertake very extensive additions to and improvements in the departments of physiology, bacteriology, anatomy, botany, geology, public health, architecture, and applied mechanics. For these purposes, and for the resulting equipments and adaptations, an expenditure of not less than 18,000*l.* has to be met immediately. The object in view is specially commended to friends of the college and of science by Lord Salisbury and by Lord Lister. Mr. Balfour, M.P., will preside at a special festival dinner in aid of the fund, to be held at the Hall of Lincoln's Inn on Wednesday, February 14. All contributions promised before or at the dinner will be placed on the chairman's list and announced at the festival. Contributions may be sent to the Hon. W. F. D. Smith, M.P., treasurer, at King's College.

MR. W. P. HARTLEY, of Aintree, Liverpool, has added to his many donations to University College, Liverpool, the munificent gift of a completely furnished Botanical Institute. The building, which has been carefully designed to meet all the requirements of modern teaching and research, will be built of Ruabon brick with sandstone dressings, on land specially purchased for it by Mr. Hartley, and situated close to the new chemical laboratories. The building, the architect of which is Mr. F. W. Dixon, of Manchester, will consist of three main floors containing the Museum, Lecture Theatre and Junior Laboratory. Two mezzanines and top floor will provide space for senior and research laboratories, library, experimental physiology laboratory, herbarium and private rooms. The basement will contain store-rooms, heating chambers, lavatories, &c. It is expected that the new laboratories will be ready for occupation early in 1901.

THE first report of the Liverpool School of Tropical Diseases has been issued. The school was formally opened last April, with Major Ross as the lecturer in tropical diseases, and though much time has had to be devoted to organising courses of study, and arranging the material available for research, an abundance of other work has been done. The most important result, however, achieved by the school, was the despatch of an expedition to West Africa to investigate the prevalence there of tropical malaria and other diseases. The expedition, which started at the end of July and returned in October, chose Sierra Leone as the field of their labours, owing to its proximity to Liverpool, the time at their disposal being short. The results of the expedition have been in the highest degree satisfactory, and a report on its labours is now in course of preparation, and will shortly be issued. The expedition brought back a considerable amount of very valuable material for teaching purposes, more especially a unique collection of malaria infected mosquitoes, which have proved exceedingly useful for demonstration purposes. Full recognition by the Government has not yet been extended to the school, and until that recognition is given, the class of students most desired, namely, medical officers about to enter into the service of the Government in tropical colonies, will not be attracted. It is confidently expected, however, that full recognition will shortly be given, and that the medical officers in question will be allowed the option of undergoing their course of instruction in tropical medicine at Liverpool.

A DEPUTATION of the Agricultural Education Committee waited upon the Duke of Devonshire at the Education Department on Friday last, to urge the adoption of certain educational reforms on the lines of a series of resolutions which were adopted a short time ago by the executive of the Committee. Among other reforms, the resolutions suggested that in view of the importance of concentrating the control of agricultural and rural education in the hands of one Government department, the educational work of the Board of Agriculture should be transferred to the new Board of Education; that the staff of the new board should include an adequate number of inspectors well